PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 5 : A23L 1/308 — A1

(11) International Publication Number: WO 94/28743

(43) International Publication Date: 22 December 1994 (22.12.94)

(21) International Application Number: PCT/FI94/00246

(22) International Filing Date: 8 June 1994 (08.06.94)

(30) Priority Data:
08/076,133 14 June 1993 (14.06.93) US

(71) Applicant *(for all designated States except US)*: ALKO LTD. [FI/FI]; Salmisaarenranta 7 H, FIN-00180 Helsinki (FI).

(72) Inventors; and
(75) Inventors/Applicants *(for US only)*: PULLINEN, Timo [FI/FI]; Korttionmäki, FIN-11130 Riihimäki (FI). LEHTOMÄKI, Ilkka [FI/FI]; Ilmarinkuja 3, FIN-05200 Rajamäki (FI).

(74) Agent: OY BORENIUS & CO AB; Arkadiankatu 21 A, FIN-00100 Helsinki (FI).

(81) Designated States: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, ES, FI, GB, GE, HU, JP, KE, KG, KP, KR, KZ, LK, LU, LV, MD, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, TJ, TT, UA, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).

Published
With international search report.

(54) Title: FOOD PRODUCTS CONTAINING β-GLUCAN ENRICHED FIBER

(57) Abstract

This invention relates to food products having longer shelf life, better organoleptic properties, better consistency, texture and/or lower amounts of fats and also better health contributing properties. These properties are obtained by using natural grain fiber preparations containing high amounts of soluble fiber, especially β-glucan.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	GB	United Kingdom	MR	Mauritania
AU	Australia	GE	Georgia	MW	Malawi
BB	Barbados	GN	Guinea	NE	Niger
BE	Belgium	GR	Greece	NL	Netherlands
BF	Burkina Faso	HU	Hungary	NO	Norway
BG	Bulgaria	IE	Ireland	NZ	New Zealand
BJ	Benin	IT	Italy	PL	Poland
BR	Brazil	JP	Japan	PT	Portugal
BY	Belarus	KE	Kenya	RO	Romania
CA	Canada	KG	Kyrgyzstan	RU	Russian Federation
CF	Central African Republic	KP	Democratic People's Republic of Korea	SD	Sudan
CG	Congo			SE	Sweden
CH	Switzerland	KR	Republic of Korea	SI	Slovenia
CI	Côte d'Ivoire	KZ	Kazakhstan	SK	Slovakia
CM	Cameroon	LI	Liechtenstein	SN	Senegal
CN	China	LK	Sri Lanka	TD	Chad
CS	Czechoslovakia	LU	Luxembourg	TG	Togo
CZ	Czech Republic	LV	Latvia	TJ	Tajikistan
DE	Germany	MC	Monaco	TT	Trinidad and Tobago
DK	Denmark	MD	Republic of Moldova	UA	Ukraine
ES	Spain	MG	Madagascar	US	United States of America
FI	Finland	ML	Mali	UZ	Uzbekistan
FR	France	MN	Mongolia	VN	Viet Nam
GA	Gabon				

Food products containing β-glucan enriched fiber

The Technical Field of the Invention

The present invention relates to food products and methods for their preparation. These food products have longer shelf-life, better organoleptic properties, consistency and texture, better health contributing properties. They also require a lower amount of fats than traditional products. The good properties of the food products of the present invention are obtained by using natural, grain fiber preparations containing a high amount of soluble fiber, especially β-glucan.

The Background fo the Invention

Recently, researchers have concluded that dietary fibers - both soluble and insoluble - are important in the prevention of certain large-intestine diseases, including cancer of the colon and diverticulitis. Furthermore, soluble fibers, especially oat β-glucan have been shown to reduce blood cholesterol, and therefore soluble fiber is believed to play an important role in the prevention of coronary heart diseases.

A great number of consumer food products containing fiber material from oats or other sources have been developed and are offered to consumers. However, the levels of soluble fiber and β-glucan are often too low in these products to provide health benefits for human beings, as demonstrated by several researchers. This is because consumers prefer good quality food products and high amounts of traditional fiber often impairs on the quality and mouth-feel of the product.

U. S. Pat. No. 4,996,063 describes an oat fiber product obtained by enzymatic hydrolysis from oat bran and oat flour. The process is quite complicated and the β-glucan concentration of the obtained fiber product is not expressed.

U. S. Patents No. 5,106,640 and No. 5,183,677 disclose a β-glucan enriched grain fiber and a process for preparing the same. According to these publications an especially advantageous grain fiber product, preferably an oat or barley fiber product, contains 15 - 40 % (w/w) β-glucan. This kind of fiber fraction has healthful effects and it can be used as a raw material or additive in food industry. In this publication neither formulations nor recipes of food products containing the β-glucan enriched grain fiber preparation is disclosed. No specific effects of this preparation to the food products is described either.

Carper. J. describes in his publication "Barley, Oats and the Vegetarian Secret" in "The Food Pharmacy" a Bantham Book, Toronto (1988) the use of oat bran cereals for the preparation of healthier foodstuffs. The oat bran cereals are not fractionated according to the method disclosed in U. S. Patents No. 5,106,640 and No. 5,183,677. As a consequence Carper's preparations contain large amounts of starch. Thus, the foodstuffs described by Carper lack the prerequisite for the additional beneficial properties of the products of the present invention, i. e. the anti-oxidative properties and the long shelf-life of the soluble β-glucan-containing fibers used in the present invention.

Uusitupa M. et al. have examined the effect of β-glucan on serum lipids in hypercholesterolemic subjects, see, The Journal of the American College of Nutrition, Vol. 11, No. 6, 651 - 659 (1992). The authors noticed that an oat bran product enriched with β-glucan resulted in an additional reduction of

total cholesterol and low-density lipoprotein cholesterol in serum. Further β-glucan is well known in the art and subject to many other publications.

The long shelf-life is one among the multitude of desirable and important properties of food products. Recent studies have shown that the soluble β-glucan containing alimentary fibers described in U.S. Patents No. 5,106,640 and No. 5,183,677 are especially suitable for the production of such foodstuffs. To obtain such a long shelf-life for food products a great number of artificial preservations, antioxidants and other stabilising agents etc. are used at present. For example, because it is desirable that bakery products keep their softness long enough, artificial additives and anti-staling agents are used. Fat-containing food products, for instance, because extruded products and some confectionaries turn rancid easily without the use of antioxidants, many other artificial additives are also included into the food stuffs. This is done not only to achieve longer shelf-life but also for other reasons, to obtain other desired properties. Typical exemples of food products containing different artificial additives are for instance bakery and cereal products, processed meat, ready food, dairy and some beverage products, confectioneries etc.

Freezing of finished or semifinished food products have been used to increase shelf-life of various products. Good examples are frozen dough or bakery products, prepared foods etc. One problem in frozen products is that the quality deteriorates during freeze period or upon thawing. This is caused by water movement and subsequent crystallisation inside the product.

Consumers have began to take a more and more critical attitude towards the artificial additives in all kinds of food products. One reason for this may be the discussions of the influences of the artificial additives on the increasing extent of allergic reactions.

The increasing interest of consumers in more healthy food and health food products has also lead to the development of more natural food products. As described above, it is well known that different fiber products have very good health contributing properties. The problem has been, how to get them into the food products so that they do not impair the properties of food. On the other hand, there is a great need for finding methods for processing better and still more "natural" food products without any artificial additives.

Therefore, one object of the present invention is to provide food products having natural additives instead of artificial additives.

A second object of the present invention is to provide food products having longer shelf-life.

One object more of the present invention is to provide food products having better freeze-thaw properties.

Still another object of the invention is to provide food products having acceptable eating quality, i.e. good organoleptic properties and desirable consistency and texture.

There is one further object of the present invention to provide food products containing healthy raw materials and food products having health maintaining or health contributing properties per se or together with other products.

One further object of the present invention is to provide a method for manufacturing food products having the above mentioned desirable properties.

Still an object of the invention is to produce food products according to the invention in a more economical way.

One further objective is to make the addition of the grain fiber to the food stuff more easy to handle by using precooking processes or by using undried products, i.e. by using wet grain fiber products.

The Summary of the Invention

The grain fiber preparations, more preferably the oat or barley fiber preparations containing high amounts of soluble fiber, especially β-glucan, have, as known in the art, very good health maintaining and even health contributing properties. However, it has now been noticed, very surprisingly, that with fiber products containing high amounts of soluble fiber, especially β-glucan, i.e. fiber containing 8 - 60 % by weight of β-glucan, it is possible to get a longer shelf-life, better freeze-thaw properties and better consistency and texture for different food products without impairing the organoleptic properties like taste and odor. All this is achieved in a very healthy and still in an economical way. It is in fact, highly surprising that the as such known healthy fiber product could provide also such additional, desirable properties to the food products.

The present invention is thus related to a food product with longer shelf-life, better organoleptic properties, better consistency, texture and good health maintaining or health contributing properties, which food product comprises 0,25 - 70 % (w/w) of a natural, soluble, grain fiber preparation. The food product comprises a grain fiber preparation, which preferably is an oat or barley fiber preparation, most preferably an oat fiber preparation.

The food product of the present invention can be a bakery product containing 0,5 - 20 % (w/w), preferably 1 - 15 % (w/w) of said natural, soluble grain fiber preparation or a processed meat or ready meat product containing 0,5 - 6 % (w/w) of said grain fiber preparation. Other alternatives of the food

product is an extruded product containing 10 - 60 % (w/w) of said grain fiber preparation. Said extruded product is selected from a group comprising snacks or breakfast cereals. The food product can also be a dairy product, a dairy product substitute or a beverage type product, which contains 0,5 - 10 % by weight, preferably 1 - 5 % (w/w) of said grain fiber preparation.

The grain fiber preparation used in the food product comprises 8 - 60 % (w/w) of β-glucan. The grain fiber preparation can be used in dry or wet form, when added to the food product.

In some applications, the dry grain fiber preparation is not dissolved rapidly enough. Thus, a wet preparation would be preferred. There are essentially two ways to prepare the wet β-glucan preparation, one is to omit the drying stage, the other is to submit the preparation to a pre-cooking procedure.

The wet grain fiber comprises about 20 - 40 % (w/w), preferably 30 % (w/w) dry-matter. The man skilled in the art can easily modify the recipes using dry preparation to recipes using wet preparations.

The food product of the present invention has a prolonged shelf-life, which is achieved without significant amounts of artificial preservation agents, antioxidants and stabilising agents. This means that no or smaller amounts of preservativation agents, antioxidants and stabilising agents can be used than the amounts previously used in conventional food stuffs.

The method for preparing a food product according to the present invention includes the addition of a natural, soluble, grain fiber preparation in wet or dry form to said food product during the manufacturation in an amount of 0,25 - 70 % (w/w) to obtain the food product of the present invention.

The food products and the method of producing the same according to the invention are stated in more detail in the claims.

The detailed Description of the Invention

The long shelf-life of food products containing beta-glucan enriched soluble grain fiber is based partly on the prevention of starch degradation, when water is glued in the structure of β-glucan. This unique property is achieved when the method described in U.S. Patents No. 5,106,640 and No. 5,183,677 is used. These patents disclose an easy and elegant method to separate the β-glucan containing fibers from starch. Partly, the pheneomenom is based on the high water holding capacity of the β-glucan enriched fiber. When more water is glued in the structure of a product, it remains softer. Partly, it is based on the phenomenon that in some food products β-glucan enriched fiber has antioxidative effect (e.g. deep fried products).

The conventional dried, especially the drum-dried β-glucan preparation is useful in many application, but in some application a wet form is preferred. In some application the problem is that the grain fiber does not become wet rapidly enough. This is due to the industrial process, in which the drum-drying is performed in high temperatures and the product starts to boil before it is dried. During the boiling the cell walls of the product are disruptured and the remaining starch is gelatinised.

In some applications, such as the preparation of meat balls, which are prepared in extremely cold conditions, the dry grain fiber is not dissolved rapidly enough. Thus, the use of a wet preparation would be preferred.

There are essentially two ways to prepare the wet β-glucan preparation, one is to omit the drying stage, the other is to

submit the preparation to a precooking procedure. This precooking procedure is especially important, when it is desirable, that the grain fiber preparation dissolves instantly.

The wet grain preparation is also desirable in baking. The dried grain fiber preparation is subjected to precooking and is weighed and packaged in suitable batches and delivered to the bakeries for immediate use.

The wet grain fiber comprises about 20 - 40 % (w/w), preferably 30 % (w/w) dry-matter. The man skilled in the art can modify, calculate and convert the amount of water and grain fiber needed in the recipes, which use wet grain fiber preparations so that the amounts correspond to those disclosed in the recipes described below.

In bakery products, for instance in bread, β-glucan enriched fiber slows down the staling process, which for the most part is caused by starch retrogradation. Breads can be kept soft and they taste fresh without any artificial additives or anti-staling agents. This applies also to other flour based products, which have tendency to harden when time passes.

An other example relates to extruded products such as snacks and breakfast cereals. Snacks etc. contain more or less fat, which can very easily turn rancid without any artificial antioxidants. By using β-glucan enriched soluble grain fiber preparations, most preferably soluble oat fiber preparations, in extruded products as an additive or as the sole raw material, the rancidity can be avoided without any artificial additives. β-glucan enriched fibers act here as an antioxidant forming - as is assumed - a shielding layer around the fatty molecules preventing them from turning rancid. Of course the antioxidative effect is not limited only to extruded products mentioned here. The antioxidative effect is the same in all fat containing food products.

A third example of the area of the present invention is processed meat, ready food products and dairy products. These products can be prepared by using β-glucan enriched soluble grain fiber to obtain products having better consistency and texture and longer shelf-life. In dairy products the characteristical high viscosity of β-glucan enriched fiber can be used to provide texture and mouthfeel in low fat products. The grain fiber product can successfully substitute some other less healthy or more expensive components in the above mentioned products.

Still a further example of the present invention relates to pizza doughs. When β-glucan enriched grain fiber is used in pizza doughs the freeze-thaw stability of pizzas are surprisingly improved.

In addition, to the improved consistency the β-glucan fiber preparation gives to some products, it can of course also act as an antioxidant or as a water holding component.

Different amounts of the soluble β-glucan enriched grain fiber preparation, which contain 8 - 60 % by weight of β-glucan, can be used in food products. The amount can vary in wide ranges depending on the food product and on the main purpose of the preparation in food products. The amounts of 0,25 - 70 %, preferably 0,5 - 60 %, most preferably 1,0 - 50 % by weight of the total weight of the ingredients of the food product are possible. When the fiber is acting as an additive, smaller amounts can be used. When the fiber preparation is used as the sole or main raw material it is possible to use higher amounts.

For instance, in bakery products with only 0,5 % by weight content of β-glucan enriched fiber, it is possible to obtain bakery products having longer shelf-life. Amounts of about 0,5 - 20 % by weight are very suitable and acceptable, amounts of about 1 - 15 % by weight being more preferable in bakery pro-

ducts, such as bread, cookies etc. In pizzas only 1 % β-glucan enriched fiber improves product performance and provides excellent freeze-thaw properties. Prepared foods e.g. blood pancakes and small pancakes containing 0,5 - 6 % by weight of β-glucan enriched soluble grain fiber have better texture and taste than the reference in fresh products and also after 14 days the same properties were better than in the pancakes without any β-glucan enriched fiber. As an example of processed meat products liver sausage can be mentioned, in which a 2 % content of said grain fiber preparation improves the taste and makes it possible to use cheaper ingredients. Another example is minced meat patties where a 6 % content improves the yield of the patties. Extruded products, for instance multi-grain chips can contain up to 60 % by weight β-glucan enriched grain fiber preparation. These products, which contain such high amounts of the fiber preparation have excellent eating quality, they are easy to handle during processing and they have reduced fat absorption during frying. The healthy β-glucan enriched soluble grain fiber increases distinctly the shelf-life of the multi-grain chip, which was found to have a very good overall sensory quality after 4 months.

In the following examples, the invention is described in more detail. The purpose of these examples is not to limit the scope of the protection but to illustrate the invention in depth.

Example 1

Bakery products and dough preparation and baking

Four bread doughs (a reference and three tests according to the invention) were prepared using following ingredients:

Table 1

Ingredients of bread doughs

	Ref/w-% of flour	Tests/w-% of flour
Wheat flour	100	90, 94 or 98
Fiber product	0	2, 6 or 10
Water	*	*
Compressed yeast	3	3
Sugar	2	2
Salt	1,5	1,5
Margarine	2	2
Emulsifier (Panadon 10)	0,3	0,3

* as needed for constant consistency

The dough absorption for constant consistency of doughs (500 BU) was determined by the Brabender Farinograph with a 300 g bowl. The fiber product was added at dough mixing either as dry powder or after pre-soaking with water as a 10 % suspension for 14 hours at 30 °C with constant gentle mixing.

Doughs were mixed with a Diosna mixer; the floor time was 20 min. at 28 °C. Doughs were weighed to give pieces of 300 g of flour and proofed to optimum at 36 °C and 85 % RH. The breads were baked for 30 min. at 220 °C.

Table 2

Baking results of breads with different amounts of β-glucan enriched fiber

Test	β-glucan enriched fiber	Ref. of flour	2 w % of flour	6 w % of flour	10 w % of flour
Proofing time (min)		40.0	45.0	45.0	45.0
Loaf weight (g)		432.0	441.0	451.0	461.0
Baking loss (%)		13.1	13.0	13.1	14.2
Loaf volume (ml)		1660.0	1770.0	1770.0	1720.0
Spec. vol. (ml/g)		3.83	3.87	3.93	3.73
Loaf height (mm)		73.0	67.0	67.0	68.0
Loaf diameter (mm)		180.0	179.0	182.0	181.0
Form ratio (%)		40.7	37.5	36.7	37.4
Crumb moisture	1st day	42.2	43.1		45.5
	3rd day	40.7	42.5	44.4	44.9
Crump firmness	2 hours	0.16	0.13	0.16	0.15
	1st day	0.30	0.24	0.29	0.25
	3rd day	0.49	0.43	0.34	0.38

Bread loaves were weighed; the volume was determined by rapeseed displacement (standard deviation 15 ml) and the appearance and crumb properties were evaluated by an experienced baker. Bread loaves for crumb measurements were stored at

20°C. Before measurement, loaves were cut into 15 mm slices with a slicer. The crumb properties were measured by a Texture Analyzer TA: XT2 using 40 % compression and a 20 mm cylinder moving at a speed of 1,7 mm/s and working in TPA mode. Crumb properties were measured 2 h, 1 day and 3 days after baking. The results presented are the average of at least 8 measurements of each loaf of every baking (standard deviation 0,01 - 0,04). The crumb moisture was determined by oven drying (1 h at 130 °C) of the ground crumb.

All tests of the example 1 were made by VTT, Technical Research Centre of Finland, Biotechnology and Food Research, Research Report BEL 515/94.

Example 2

Bakery products

Oatmeal cookies were prepared using following ingredients:

The ingredients were mixed together in an usual way and baked. The final cookie was rated good in quality, i.e. the taste and odor were pleasant and the texture was good.

Table 3

Ingredients of oatmeal cookie

	w/w-%
Partially hydrogenated vegetable oil	21,33
Granulated sugar	17,26
Cookie flour, unbleached	15,11
Brown sugar	13,28
Rolled oats	11,90
β-glucan enriched fiber	11,15
Whole liquid eggs	8,57
Vanilla extract (single strength)	0,86
Salt	0,21
Baking soda	0,11
Baking powder, double acting	0,11
Non-fat dry milk	0,11

Example 3

Baked goods - pizza

Two pizza doughs (a reference and one test according to the invention) were prepared using the following ingredients:

Table 4

Ingredients of pizza doughs

	Ref. / w/w %	Test / w/w %
English Bakers Flour	60,60	59,60
Finely divided β-glucan enriched oat fiber	0	1,0
Water	36,36	33,36
Fresh Yeast	1,51	1,51
Salt	1,10	1,10
Lard	0,42	0,42
Ascorbic Acid	0,01	0,01

Table 5.

Topping

Same for reference and test

	w/w %
Chopped Tomato	59,76
Cheese-Grated Cheddar	39,84
Mixed Herbs	0,40

All dry ingredients were placed into the Morton mixer and mixed for 100 s. on slow. The water was added and mixed for a further 30 s. Then the mixture was mixed on high gear for the equivalent 18 kwatt hours.

The dough was weighed into 460 g lots and kneaded into ball and proved for 50 minutes at 30 °C. The dough was remoulded into shape and then rolled out. Pizza bases were baked in pizza oven at 225 °C for 6 min. and after that allowed to cool. Bases were covered with topping and packed and freezed at -18 °C. The test pizza containing β-glucan enriched oat fiber had improved product performance in comparison with the reference and it had excellent freeze-thaw properties.

Example 4

Processed meat - minced meat patties

Minced meat patties (ref. and test) were prepared in pilot scale using following ingredients:

Table 6.

Ingredients of minced meat patties

	Ref. / w/w %	Test / w/w %
β-glucan enriched oat fib.	0,0	6,0
Beef 80	26,0	23,0
Pork 50	26,9	23,9
Water	32,4	35,4
Mix	11,7	11,7
Isolated soya	1,0	0,0
Texturated soya	2,0	0,0

Beef 80 = 80 % lean beef trimmings with max. 20 % visable fat
Pork 50 = 50 % lean pork trimmings with max. 50 % visable fat

Mix = breadcrumbs, potato grain, glucose, milkprotein, onion, garlic, salt, spices (mustard, coriander etc.), hydrolysated protein and sodium glutamate (E 621).

Preparation

Beef and pork were ground with a 3 mm plate. Dry ingredients were blended througly. Water was added and mixed. Mixture was laid down for 30 min. Beef and pork were added and mixed. Mass was laid down for 20 min. Mass was formed into patties. Patties were fried in oil.

Organoleptic properties (taste and odor) of test patties were as good as the same of the reference. The yield of test minced meat patties was instead better and with the fiber preparation it is possible to substitute some more expensive raw materials and additives.

Table 7

Weight loss of patties

	Ref.	Test
Weight loss / %	25,6	23,1

Example 5

Processed meat - liver sausage

Liver sausages (reference and test) were prepared in pilot scale using following ingredients:

Table 8

Ingredients of liver sausages

	Ref. / w/w %	Test / w/w %
β-glucan enriched oat fib.	0,0	2,0
Liver, pork	18,0	18,0
Pork 45	43,0	45,0
Pork 90	18,7	9,7
Cooking water	15,0	20,0
Blend	4,0	4,0
Salt	1,3	1,3
Sodium solution (10 %)	1,2 ml/kg	1,2 ml/kg

Pork 45 = 45 % lean pork trimmings with max 55 % visible fat
Pork 90 = 90 % lean pork trimmings with max 10 % visible fat
Blend = Sugar, phosphate (E450 and E451), spices (mustard, pepper etc.) hydrolysated protein, milk protein, dried onion GdL, ascorbic acid (E300), salt, sodium glutamate (E621), natural flavors.

Preparation

Liver and pork were precooked and chopped to emulsion while adding blend, salt sodium solution, cooking water and fiber preparation. Mass was filled in casings. Sausages were steam-cooked at 76 °C until internal temperature 72 °C was reached.

Organoleptic properties (taste, odor, color and structure) were in test sausages as good as in reference sausages. By using β-glucan enriched oat fiber in sausages it is possible to use cheaper ingredients, see the content of pork 90.

Example 6

Prepared foods - blood pancake

Blood pancakes were prepared with different amounts of β-glucan enriched oat fiber in pilot scale using following ingredients:

Table 9

Ingredients of blood pancakes

	Ref. / w/w-%	Test1 w/w-%	Test2 w/w-%	Test3 w/w-%	Test4 w/w-%	Test5 w/w-%
β-glucan enrich. fib.	0	1	2	4	2	5
Blood	40	40	40	40	40	40
Water	30	30	30	30	34	35
Margarine	5	5	5	5	5	5
Flour	9	8	8	7	6	4
Rye flour	15	15	14	13	12	10
Spice mix	1	1	1	1	1	1

Table 10

Organoleptic properties of blood pancakes

Organoleptic properties	Ref. /	Test1	Test2	Test3	Test4	Test5
Appearence*	3,0	3,0	3,0	3,0	3,0	3,0
Texture**	3,5	3,5	3,0	3,5	4,0	2,5
Taste***	4,5	4,4	4,5	4,5	5,0	4,0
TOTAL****	11,0	11,0	10,5	11,0	12,0	9,5

* 3 = good, range 0 - 3
** 4 = good, range 0 - 5
*** 5 = good, range 0 - 7
**** Acceptable product has a total score of 11 or more

Test 4 gives the best results in all properties with 2 % fiber preparation content. The fiber preparation allows for reduction of flour.

Blood pancakes were prepared also in factory scale with 0, 1 and 1,5 % (w/w) of β-glucan enriched oat fiber. The higher the amount of the fiber the more water and the less flour was used.

All the blood pancakes were made in the same way. Batter was made and pumped into a vessel. In production line the batter was dosed, baked for 5 minutes and cooled immediately. In the test, which contained 1,5 % oat fiber preparation, the dosage of the batter had to be reduced, otherwise the pancakes were

too thick. Organoleptic properties were evaluated as fresh and after 14 days. The test with 1,5 % oat fiber gave best results after 14 days and so improved the shelf life of pancakes.

Example 7

Prepared foods - small pancakes

Small pancakes were prepared in factory scale with β-glucan enriched fiber content of 0, 1 and 1,5 % by weight. The higher the amount of the fiber preparation the more water and less flour was used.

All pancakes were made in the same way. The batter was made according to the recipe and pumped into a vessel. In the production line the batter was dosed, baked for 5 minutes and cooled immediately. In the test, which contained 1,5 % fiber preparation the dosage of the batter had to be reduced; otherwise the pancakes were thicker than the 0-reference.

Table 11.

Organoleptic properties and moisture content of small pancakes

The β-glucan enriched oat fiber improved distinctly the yield of small pancakes. Small pancakes with 1,5 % fiber content were best in organoleptic evaluation fresh and also after 14 days. The moisture content increased in small pancakes with fiber preparation.

FRESH	Ref.	1 w/w-%	1,5 w/w-%
Appearance*	2,5	2,5	3,0
Texture**	4,0	3,5	4,0
Taste***	5,0	5,0	5,0
Total****	11,5	11,5	12,0
Moisture (%)	55,5	60,1	63,3

AFTER 14 DAYS	Ref.	1 w/w-%	1,5 w/w-%
Appearance*	3,0	3,0	3,0
Texture**	3,5	3,5	4,0
Taste***	5,0	5,0	5,0
Total****	11,5	11,5	12,0

*, **, ***, **** same as in example 6.

Example 8

Extruded products - multi-grain chip

Multi-grain chips were prepared with different β-glucan enriched oat fiber contents using following ingredients:

Table 12

Ingredients of multi-grain chips

	MGC2/w/w-%	MGC3/w/w-%	MGC5/w/w-%
β-glucan enrich. fib	20,23	30,23	50,23
Corn flour	45,70	40,70	30,70
Rice flour	14,36	12,00	7,00
Whole wheat flour	9,96	7,32	2,32
Wheat bran	3,00	3,00	3,00
Sugar	6,00	6,00	6,00
Myvaplex	0,75	0,75	0,75

All the ingredients were mixed for 15 minutes. The extruder was brought up to temperature and stabilized using ordinary durum flour and Myvaplex. The product was cooled and deep fat fried in soybean oil (230 °C) and lightly salted.

The overall sensory quality of the products were estimated after 4 months.
MGC 2 overall rate 11

MGC 3 overall rate 11
MGC 5 overall rate 6.
The range was; 4 = good, 12 = bad

The fiber preparation gave to the product excellent eating quality and good handling during processing and reduced fat absorption during frying. Healthy β-glucan enriched soluble grain fiber preparation ingreased distinctly the shelf-life of the multigrain chip.

Example 9

Dairy products

Low fat set yogurt (ref. and test) were prepared using following ingredients:

Table 13

Ingredients of low fat set yogurt

	Ref. / w/w-%	Test / w/w-%
Skimmed milk (0,1 % fat)	91,00	88,5
Sugar	6,00	6,00
Skimmed milk powder	1,50	1,50
Dairy-Lo*	1,50	1,50
β-glucan enriched fib.	0	2,5
Flavours/Culture	as required	as required

* Pfizer (0304 615507): Whey protein concentrate

Preparation

Dry ingredients were dispersed into milk. The dispersion was heated to 85 °C, holded 3 minutes in that temperature and cooled to 50 °C. After that it was inoculated, flavours were added and filled. The yogurt was incubated at 44 °C until requided pH was reached and cooled.

β-glucan enriched fiber preparation gave good textural and sensoral properties to the yogurt. The yogurt containing fiber preparation had also good flavour release and good mouthfeel.

Claims:

1. A food product with longer shelf-life, better organoleptic properties, better consistency, texture and good health maintaining or health contributing properties, which food product comprises 0,25 - 70 % (w/w) of a natural, soluble, grain fiber preparation.

2. The food product of claim 1, wherein said grain fiber preparation is preferably an oat or barley fiber preparation, most preferably an oat fiber preparation.

3. The food product of claim 1, wherein the food product is a bakery product containing 0,5 - 20 % (w/w), preferably 1 - 15 % (w/w) of said natural, soluble grain fiber preparation.

4. The food product of claim 1, wherein the food product is a processed meat or ready meat product containing 0,5 - 6 % (w/w) of said grain fiber preparation.

5. The food product of claim 1, wherein the food stuff is an extruded product containing 10 - 60 % (w/w) of said grain fiber preparation.

6. The food product of claim 5, wherein the extruded product is selected from a group comprising snacks or breakfast cereals.

7. The food product of claim 1, wherein the food product is a dairy product, a dairy product substitute or a beverage type product, which contains 0,5 - 10 % by weight, preferably 1 - 5 % (w/w) of said grain fiber preparation.

8. The food product of claim 1, wherein the grain fiber preparation comprises β-glucan 8 - 60 % (w/w).

9. The food product of claim 1, wherein the grain fiber preparation is in dry form, preferably drum-dried form.

10. The food product of claim 1, wherein the grain fiber preparation is in a wet form, containing 20 - 40 % (w/w) preferably 30 % (w/w) of dry matter.

11. The food product of claim 1, wherein the prolonged shelf-life is achieved without significant amounts of artificial preservation agents, antioxidants and stabilising agents.

12. A method for preparing a food product in which process a natural, soluble, grain fiber preparation is added to said food product during the manufacturing in an amount of 0,25 - 70 % (w/w) to obtain a food product, which has a longer shelf-life and better organoleptic properties, better consistency, texture and contains lower amounts of fats and has better health contributing properties.

13. The method of claim 12, wherein the grain fiber preparation is preferably oat or barley fiber preparation, most preferably oat fiber preparation.

14. The method of claim 12, wherein the grain fiber preparation is added to a dough for making a bakery product 0,5 - 20 % by weight, preferably 1 - 15 % (w/w).

15. The method of 12, wherein said grain fiber preparation is added to a processed meat product or a ready meat product in an amount of 0,5 - 6 % (w/w) during processing.

16. The method of claim 12, wherein said grain fiber preparation is added during processing to an extruded product in an amount of 10 - 60 % (w/w).

17. The method of claim 16, wherein the extruded product is selected from a group comprising snacks and breakfast cereals.

18. The method of claim 12, wherein said grain fiber preparation is added to a dairy product, a dairy product substitute or a beverage type products in amount of 0,5 - 10, preferably 1 - 5 % (w/w).

19. The method of claim 12, wherein the grain fiber preparation is a grain preparation containing 8 - 60 % (w/w) of β-glucan.

20. The method of claim 12, wherein the grain fiber preparation is added in dry form, preferably in drum-dried .

21. The method of claim 12, wherein the grain fiber preparation is added in wet form, either as an undried or precooked preparation containing 20 -40 % (w/w), preferably 30 % (w/w) of dry matter.

22. The method of claim 12, wherein the prolonged shelf-life is achieved without adding significant amounts of artificial preservation agents, antioxidants and stabilising agents.